ELECTROSTATIC FLOCKING METHOD

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Inventor:	FUJIWARA CHIKASHI; OOHARA TAKAHISA
Applicant:	TOYOTA MOTOR CO LTD
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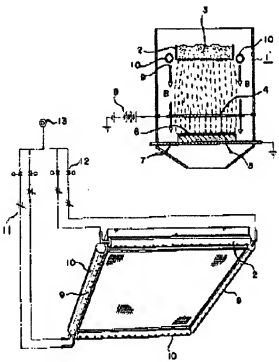
Abstract of **JP59000362**

PURPOSE:To uniformly carry out the flocking of piles on the surface of a work, in a flocking method due to Down process, by generating a forcible air stream to a downward direction from the side part of a pile falling apparatus. CONSTITUTION:When the screen 2 of an electrostatic flocking apparatus 1' is vibrated, the piles 3 stored thereon is fallen to be charged through a high voltage electrode 4 and sucked by a work 5 to be thrust into the adhesive layer on the surface thereof to flock the work 5. In this case, blow-out pipes **10**, 10,... having plural nozzles 9 opened in a downward direction are provided to the sides of the inner frame of the casing in the apparatus 1' and connected to a compressed air source 13 through a flow control valve 11 and a solenoid valve 12. In flocking, the nozzles 9, 9,... are preliminarily controlled so as to coincide the speed of an air stream with the falling speed of the piles 3 to generate a forcible air stream so as to make blow-out streams parallel. By this method, the piles 3 are attracted to the side of the air stream B and fallen on the work parallelly in a uniformly distributed state without being concentrated to the center thereof.



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(全 5 頁)

⑤静電植毛方法

⑫発　明　者　大原孝久
豊田市トヨタ町1番地トヨタ自動車工業株式会社内

⑦出　願　人　トヨタ自動車株式会社
豊田市トヨタ町1番地

⑭代　理　人　弁理士　宮田幸春

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⑫発　明　者　藤原力司
豊田市トヨタ町1番地トヨタ自動車工業株式会社内

明　細　書

1.発明の名称　静電植毛方法

2.特許請求の範囲

(1) パイル落下装置からパイル群を落下させ高圧電極を通過させて帯電させワークの被植毛面に立植させるようにした静電植毛方法において、上記パイル落下装置の側部から強制気流を下向に生じさするようにしたことを特徴とする静電植毛方法。

(2) パイル落下装置からパイル群を落下させ高圧電極を通過させて帯電させワークの被植毛面に立植させるようにした静電植毛方法において、上記パイル落下装置の側部から強制気流を下向に生じさせるようにし、而して該強制気流が複数の発生部位にて時間的偏差ずれを有して発生されるようにしたことを特徴とする静電植毛方法。

3.発明の詳細な説明

同示技術は樹脂部品等に短繊維を密植させる技術分野に属する。

而して、この出願の発明は静電植毛装置のパイル落下装置にストックした所定長さの短繊維パイルをワークに向け落下させ、その落下過程で網状或いは、スリット状の高圧電極を通過させベースに載置セットしたワークに静電吸引され、その表面の塗膜に正立到設されて密植状態にされる静電植毛方法に関する発明であり、特に、上記パイル落下装置の側部から下方に向けて複数部位で同時に、或は、規則的、不規則的に強制気流を流下させ、パイルの落下分布が均一になるようにした静電植毛方法に係る発明である。

周知の如く、自動車の樹脂部品、例えば、室内部品等に美観え等の意匠性を良くし、外観を向上させ、柔軟性を出し感触性を出す等の点から約1㎜長の細径短繊維を帯電させ、アースしたワークに吸引させ、その表面に塗装した接着剤層に突き刺し、密植状にする静電植毛法が開発採用されている。

而して、このうちダウン法と呼ばれる植毛法は該短繊維パイルの重力落下と静電吸引が相伴う

ため、広く用いられ、さまざまなタイプのものが種々の改良を経て実用化されている。

さりながら、落下装置の部から集合的に落下するパイル群は空気象的に植毛室内で周囲の空気を伴つて下向気流を生じ、該下降気流はまたパイルの流過に変動を与える。

すなはち、第1図に示す様に静電植毛装置1の前2にストックされたパイル3は落下し高圧電極網4を流過して帯電され、アースされたワーク5の表面の接着剤層6に突き刺さり植毛されるが、植毛帯接近領には上述の如く循環流の気流Aが生じ、それによりパイル群3は中央、或は、落下量の多い部分に集中し、その結果、少い部分はワークに於て得毛部を形成し、多い部分は過剰な分はパイルが堆積して所謂毛倒れ現象を起す欠点があつた。

この出願の発明の目的は上述従来技術に基づく静電植毛の問題点を解決すべき技術的課題とし、植毛室に於けるパイルの分布が均一である様にし、ワーク表面のパイルの植毛が均一に行われる様にしてインテリヤ産業に於ける人工植毛品利用分野に益する優れた静電植毛方法を提供せんとするものである。

上述目的に沿うとの出願の発明の構成は、静電植毛装置パイル落下装置の側部からパイル落下域に沿つて全域同時に、或は、規則的、不規則的に平行的に空気流を強制気流にしてパイル落下速度と同速度で流下させ、落下装置から落下するパイルは植毛室内にて平均分布で偏倚分布せずに落下し、或は、下向気流に引き寄せられる傾向が交互に、或は、順に向きを変えることにより経時的に平均分布し、その結果、ワーク表面に植立するパイルは平均密植されて薄毛、毛倒れ現象少ない様にした技術的手段を講じたことを要旨とするものである。

次にこの出願の発明の実施例を第2図以下の図面にしたがつて説明すれば以下の通りである。尚、第1図と同一態様部分については同一符号を用いて説明するものとする。

第2、3図に示す実施例に於て、1'は静電植毛装置であり、そのケーシングの上部には図示しない振動装置に連結した振動筒2が設けられて設定サイズのパイル3を収納して落下するようにされ、下部のアースされたセットプレート7には被植毛ワーク5が接着剤層6を有して載置されるようになつている。

而して、該振動筒2とセットプレート7との間には高圧電源8に接続された網タイプの高圧電極4が配設されている。

而して、この出願の発明に於ては上記静電植毛装置1のケーシングの内側フレームに図示しないブラケットを介して多数のノズル9、9…を下向に開口した吹出しパイプ10、10…が強設され、該各吹出しパイプ10、10…は流量調整弁11、電磁弁12を直列に介設して圧縮空気源13に接続されている。

上述静電植毛装置1により植毛するに際しては振動筒2にパイル3を収納ストックし、高圧電極4に通電して電磁バルブ12、12…を開き、流量調整弁11、11…を調整して各吹出しパイプ10、10…のノズル9、9…から空気流がパイル3の落下速度0.1～1.0 m/sec に一致するべく調整して吹出流が平行になるように強制気流Bを生じさせる。

このようにセットして振動筒2を起振させパイル3を落下させると、該パイル3の落下速度と同一速度に近い速度で強制気流Bが下向に降下しているので下向気流側に引き寄せられて中央に集中することなく平行的に均一に分布された状態を保つて落下していき、高圧電極4を通過し、帯電され、ワーク5に吸引されてその接着剤層6に突き刺さり、全面平均密度で植立される。

したがつて、植立パイル3の状態は薄毛や、毛倒れのないものとなり、設計通りの製品精度の良い静電植毛が得られる。

実験によれば、従来態様は次の第1表に示す様に中央が密で周囲に粗な落下分布であるが、この出願の発明の場合であると第2表に示す様に比較的均一な落下分布が得られた。

（但し、第1、2表は数値部位が方形落下断面

を示し、全体落下量を50として表わしてある。）

第1表

2.2	3.0	2.1
3.5	9.1	3.6
3.2	10.3	4.7
2.2	2.9	2.4

第2表

4.0	3.8	4.2
4.4	4.3	3.7
4.2	4.3	3.2
3.7	4.5	3.4

次に第4～6b図に示す実施例は静電植毛装置1'が回転筒2'である態様であるが、該種タイプの静電植毛装置1による場合は第5a、第5b図に示す様に、該回転筒2のドラムが軸方向に長いために、パイル3の落下量Qは軸方向位置Apの方はおゝむね平均的に分布して落下するが、半径方向Rpの方は中央に集中する傾向にあり、先述した如く、分布量の少い部位では薄毛となり多い部位では毛倒れが生ずるおそれがある。

そのため、この出願の発明に於ては回転筒2'の軸方向に沿つて両側及び、両端側に圧縮空気源13に流量調整弁11、電磁弁12を直列介設する吹出しパイプ10、10…を図示しないブラケットを介して静電植毛装置1'のケーシング内側のフレームに固定し、各吹出しパイプ10、10…に鉛直方向に指向して多数のノズル9、9…を穿設してある。

而して、上記各電磁弁12、12…はタイマー14を有する制御装置15に接続され、設定時間例えば、10秒ごとに各電磁弁12、12…が順に1つづつの み開くようにされている。

尚、設定により、2つづつ開くことも可能であり、開動作時間も変更出来るようにされ、又、各吹出しパイプ10、10…は不規則に吹出し動作する様にすることも可能である。

当該装置によつて静電植毛する に際して は流量調整弁11、11…をしてパイルの落下速度に略一致する強制下向気流が発生する様に調整して、回転筒2'を回転させてパイル3を落下させる。

而して、制御装置15によりタイマー14のセット時間を介し各電磁弁12、12…が順に1つづつ設定時間開く。

そのため、各吹出しパイプ10、10…は順に作動してそのノズル9、9…から圧縮空気が下向に噴出され、それにより回転筒2'から落下するパイル3は下向気流C側に寄り偏倚して降下し、高圧電極4を通り帯電しアースワーク5に引かれ、その表面接着剤層6に突き刺さる。

さりながら、上述の如く各吹出しパイプ10、10…は電磁弁12、12…を介して1つづつ作動するため、強制気流Cは個方で交互に、又、端部にても交互に生起されるのでその都度、落下パイル3は生起強制気流C側に偏倚して降下していき、結果的に経時的には全域で平均した分布で降下することになり、ワーク5に対して社平均的分布植毛が行われ、同じく薄毛、毛倒れ現象は生じない。

そして、実験によれば回転筒2'の軸方向位置Apの経時的パイル量Qの分布は第6a図に示す様に、又、半径方向位置Rpの分布は第6b図に示す様に従来の第5a、5b図に示す分布に比し極めて優れていることが判明した。

尚、この出願の発明の実施態様は上述各実施例に限られるものでないことは勿論であり、例えば、回転薄付ロール式静電植毛方法にも適用可能である等種々の態様が可能である。

前述の如く、この出願の発明によれば、基本的にパイル落下装置の側部にパイル落下方向に沿つて強制気流を吹き出させる様にしたことにより、該パイル社強制気流にガイドされて中央部に偏倚して集中することなく、平均して分布降下し、したがつて、場所により薄毛や、毛倒れ現象が生ぜず、精度の良い設計通りの製品が得られる優れた効果が奏される。

又、パイル落下装置の周囲に設けた吹出しパイプを規則、不規則的に動作させて各個に強制気流を生じさせるようにすることにより吹出し強制気流側に強制的にパイルを偏倚降下させ、経時的には結果的に平均的降下分布とさせることが出来るため製品精度が良くなる優れた効果が奏される。

そのため、従来落毛部分を避けるため装置を大きくして設備投資が多くかつ占有空間が大きく

余分なパイルが要したのもコンパクトにより、必要パイル量で済む等優れた効果がある。

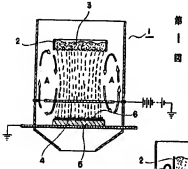
4.図面の簡単な説明

第1図は従来技術に基づく静電植毛装置概略説明断面図、第2図以下はこの出願の発明の実施例の説明図であり、第2図は1実施例の全体概略断面図、第3図は吹出しパイプの斜視説明図、第4図は別の実施例の全体概略断面図、第5a、5b図は回転筒の在来パイル落下量の軸方向、径方向分布説明グラフ図、第6a、6b図は第5a、5b図相当第4図実施例の説明グラフ図である。

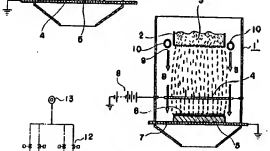
1、1'…パイル落下装置、　3…パイル、
4…高圧電極、　5…ワーク、
6…被植毛面（接着剤層）、
B、C…強制気流

出願人　トヨタ自動車工業株式会社
代理人　富　田　幸　春

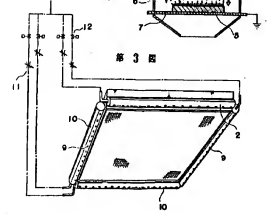
第1図

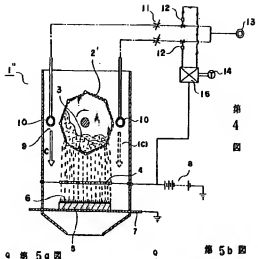


第2図

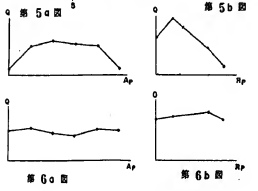


第3図





第4図



第5a図　第5b図

第6a図　第6b図

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(54) ELECTROSTATIC FLOCKING METHOD

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(72) Inventor Chikashi FUJIWARA
Toyota Motor Corporation
1 Toyota-chō, Toyoda-shi

(72) Inventor Takahisa ŌHARA
Toyota Motor Corporation
1 Toyota-chō, Toyoda-shi

(71) Applicant Toyota Motor Corporation
1 Toyota-chō, Toyoda-shi

(74) Agent Patent Attorney Yukiharu TOMITA

SPECIFICATION

1. TITLE OF THE INVENTION

Electrostatic flocking method

2. SCOPE OF PATENT CLAIMS

(1) An electrostatic flocking method that flocks pile groups in a standing manner onto a surface to be flocked of a work by causing them to fall from a pile dropping apparatus and pass a high-voltage electrode to be charged; said electrostatic flocking method characterized in that it produces forced air currents in a downward direction from the side parts of the pile dropping apparatus.

(2) An electrostatic flocking method that flocks pile groups in a standing manner onto a surface to be flocked of a work by causing them to fall from a pile dropping apparatus and pass a high-voltage electrode to be charged; said electrostatic flocking method characterized in that it produces forced air currents in a downward direction from the side parts of the pile dropping apparatus, and, in addition, said forced air currents are produced so that they have different [operation] in terms of time at a plurality of regions where they are produced.

3. DETAILED DESCRIPTION OF THE INVENTION

The disclosed technology belongs to a technical field in which short fibers are densely flocked in a resin part, etc.

In addition, the invention of this application is an invention relating to an electrostatic flocking method that drops short fiber piles of a prescribed length that have been stocked in a pile dropping apparatus of an electrostatic flocking apparatus toward a work, and, in that dropping process, causes them to pass a mesh-shaped or slit-shaped high-voltage electrode, undergo electrostatic suction to a work that has been mounted and set on a base, and be erectly stuck into a coating film on the surface thereof to be put into a densely flocked status, and, specifically, it is an invention relating to an electrostatic flocking method that simultaneously or regularly or irregularly causes forced air currents to flow down at a plurality of regions toward the bottom from the side parts of the pile dropping apparatus and causes the pile falling distribution becomes uniform.

As is well known, from the standpoint of improving design, such as the beauty of the resin parts grounded work, stuck into an adhesive layer that has been coated onto the surface thereof, and put into a densely flocked status have been developed and employed.

In addition, among these, the flocking method known as the down method includes gravity falling and

electrostatic suction of said short fiber piles, so it is widely used, and various types have gone through various improvements and come into practical usage.

However, pile groups that are dropped in a concentrated manner from the screen of the dropping apparatus produce downward air currents in conjunction with the surrounding air within a flocking chamber in a microclimate fashion, and said downward air currents, in turn, cause variation of the flow of the piles.

Specifically, as shown in Figure 1, piles 3 that have been stocked on the screen 2 of the electrostatic flocking apparatus 1 fall, flow past a high-voltage electrode 4 to be charged and are stuck and flocked into an adhesive layer 6 of the surface of a grounded work 5, but, as discussed above, air currents A with circulating flows are produced in the vicinity of the flocking tank walls, and, through this, the pile groups 3 are concentrated in the center or at portions where the falling amount is large, and, as a result, there are drawbacks in that portions where the amount is small may have sparse fiber parts formed on the work, and, in portions where the amount is large or excessive piles accumulate, a so-called fiber falling phenomenon may be produced.

The purpose of the invention of this application considers the problems of electrostatic flocking based on the aforementioned prior art as technical issues to be resolved and is to provide an excellent electrostatic flocking method that is beneficial in the field of utilization of artificial flocking products in the interior industry by being such that distribution of piles in the flocking chamber is uniform and flocking of the piles of the surface of the work is performed uniformly.

The gist of the configuration of the invention of this application, which is in accordance with the purpose discussed above, is such that a technological means is devised in which air currents are made forced air currents to cause them to fall at the same speed as the pile falling speed in parallel simultaneously in all areas or regularly or irregularly along the pile falling area from the side parts of the pile dropping apparatus of the electrostatic flocking apparatus, the piles that fall from the dropping apparatus fall in an even distribution within the flocking chamber without a clustered distribution, or, uniform distribution over time is performed by the clustering, in which there is drawing to the downward air currents, alternately or sequentially varying the orientation, and, as a result, the piles that are flocked to the work surface in a standing manner are uniformly densely flocked, and sparse fibers and a fiber falling phenomenon do not occur.

Next, the following is an explanation of the invention of this application according to the drawings from Figure 2 onward. Note that an explanation will be given using identical codes for portions with patterns identical to those of Figure 1.

In the embodiment shown in Figure 2 and Figure 3, 1′ is an electrostatic flocking apparatus, a vibrating screen 2 that is connected to a vibration apparatus that is not shown in the drawing is provided at the upper part of the casing thereof to accommodate piles 3 of a set size so that they fall, and a work 5 to be flocked has an adhesive layer 6 and is mounted on a set plate 7 whose lower part is grounded.

In addition, a mesh-type high-voltage electrode 4 connected to a high-voltage power supply 8 is arranged between the vibrating screen 2 and the set plate 7.

In addition, in the invention of this application, blow-out pipes 10, 10 … in which a plurality of nozzles 9, 9 … are opened in a downward direction are provided at the sides at the inner side frame of the casing of said electrostatic flocking apparatus 1 via brackets that are not shown in the drawing, and said respective blow-out pipes 10, 10 … are connected to a compressed air source 13 via a flow regulator valve 11 and a solenoid valve 12 in series.

In flocking by means of the electrostatic flocking apparatus 1 discussed above, piles 3 are accommodated and stocked on a vibrating screen 2, current is caused to flow to a high-voltage electrode 4 to open the solenoid valves 12, 12 … , and flow regulator valves 11, 11 … are adjusted so that air currents from the nozzles 9,9 … of the respective blow-out pipes 10, 10 … are regulated to match the 0.1 to 1.0 m/sec falling speed of the piles 3 to produce forced air currents B so that the blown currents become parallel.

When setting is performed in this way, and the vibrating screen 2 is vibrated to cause the piles 3 to drop, the forced air currents B are falling downward at a speed that is close to a speed that is identical to the falling speed of the piles 3, so they fall in parallel while maintaining an evenly distributed status without being drawn toward the downward air current sides and concentrating in the center, pass a high-voltage electrode 4 and are charged then sucked to a work 5 to be stuck onto the adhesive layer 6 thereof, and flocking in a standing manner is performed at a uniform density over the entire surface.

Therefore, the status of the piles 3 flocked in a standing manner becomes such that sparse fibers and fiber falling do not occur, and electrostatic flocking with good product precision in accordance with the design can be achieved.

According to experiments, the conventional pattern is a rough falling distribution that is dense in the center and sparse at the periphery as shown in Table 1 below, but, in the case of the invention of this application, a relatively even falling distribution is achieved as shown in Table 2.

(Tables 1 and 2 are such that the numerical regions show a square falling cross section, and the overall falling amount is expressed is as 50.)

TABLE 1

2.2	3.0	2.1
3.5	9.1	3.6
3.2	10.3	4.7
2.2	2.9	2.4

TABLE 2

4.0	3.8	4.2
4.4	4.3	3.7
4.2	4.3	3.2
3.7	4.5	3.4

Next, the embodiment shown in Figures 4 through 6b is a mode in which the electrostatic flocking apparatus 1″ is a rotating screen 2′, but in the case in which an electrostatic flocking apparatus 1 of that type is used, as shown in Figures 5a and 5b, the drum of said rotating screen 2 is long in the axial direction, so the falling amount Q of the piles 3 is such that falling occurs so that the axial direction positions Ap are generally uniformly distributed, but there is a tendency for the radial direction Rp to concentrate in the center, and, as discussed above, there is a concern that sparse fibers will occur in regions where the distribution amount is small, and falling fibers will occur in regions where it is large.

For this reason, in the invention of this application, along the axial direction of the rotating screen 2′, blow-out pipes 10, 10 … , which attach at both end sides to a compressed air source 13 via a flow regulator valve 11 and a solenoid valve 12 in series, are secured on the frame of the inner sides of the casing of the electrostatic flocking apparatus 1′ via brackets that are not shown in the drawing, and a plurality of nozzles 9, 9 are provided on the respective blow-out pipes 10, 10…by boring oriented toward the [acutely straight] direction.

In addition, the aforementioned respective solenoid valves 12, 12 … are connected to a control apparatus 15 that has a timer 14, and the respective solenoid valves 12, 12 … are opened only one at a time in sequence at set times, for example, every ten seconds.

Note that, through setting, it is also possible for them to be opened two at a time, and the opening operation time may also be varied, and it is also possible for the respective blow-out pipes 10, 10 … to perform blow operations irregularly.

In performing electrostatic flocking using said apparatus, flow regulator valves 11, 11 … are employed to perform adjustment so that forced downward air currents that approximately match the falling speed of the piles are generated to rotate the rotating screen 2′ and cause the piles 3 to fall.

In addition, a control apparatus 15 is used to perform set time opening of the respective solenoid valves 12, 12 … one by one in sequence by means of the set time of a timer 14.

For this reason, the respective blow-out pipes 10, 10 are actuated in sequence to blow out compressed air downward from the nozzles 9, 9 … thereof, and through this, piles 3 that fall from the rotating screen 2′ fall so that they incline toward the downward air current C sides, pass a high-voltage electrode 4 and are charged, are attracted by a grounded work 5, and are stuck onto the adhesive layer 6 of the surface thereof.

However, as discussed above, the respective blow-out pipes 10, 10 … are actuated one by one via solenoid valves 12, 12 … , so the forced air currents C are alternately generated at the sides or alternately generated at the end parts as well, so when this occurs, the falling piles 3 fall so that they incline toward the generated forced air current C sides, and, as a result, falling occurs in a distribution that is uniform in all areas over time, and, uniform distribution flocking is performed with respect to the work 5, and, similarly, sparse fibers and the fiber falling phenomenon do not occur.

In addition, as shown in Figure 6a, it was found through experiments that the distribution of the pile amount Q over time of the axial direction positions Ap of the rotating screen 2′ and, as shown in Figure 6b, the distribution of the radial direction positions Rp was extremely good in comparison to the distribution in the conventional method shown in Figures 5a and 5b.

Note that the mode of implementation of the invention of this application is of course not limited to the respective embodiments discussed above, and, for example, various modes are possible, with it also being possible to apply it to, for example, a rotating grooved roll type electrostatic flocking method.

As discussed above, through the invention of this application, by causing forced air currents to blow basically along the pile falling direction at the side parts of the pile dropping apparatus, said piles are guided by the forced air currents and fall in the uniform distribution without clustering to and concentrating at the center part, and therefore an excellent effect is exhibited in which the product can be obtained in accordance with the design with good accuracy without sparse fibers and the fiber falling phenomenon occurring depending on location.

In addition, by regularly or irregularly operating blow-out pipes provided in the vicinity of the pile dropping apparatus to individually generate forced air currents, the piles are forcibly caused to incline and fall to the forced air current sides, and finally, since it is possible for this ultimately to produce a uniform falling distribution, an excellent the effect in which product accuracy is good is exhibited.

For this reason, while, conventionally, in order to avoid sparse fiber portions, the apparatus was made larger causing great equipment costs to be incurred, a large space to be required, and extra piles to be required, there are excellent effects in that it has become compact and only the necessary pile amount will suffice.

4. BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is cross-sectional drawing for explaining an electrostatic flocking mode based on the prior art, Figure 2 onward are drawings for explaining an embodiment of the invention of this application, Figure 2 is an overall schematic cross-sectional view of one embodiment, Figure 3 is an oblique explanatory drawing of blow-out pipes, Figure 4 is an overall schematic cross-sectional view of another embodiment, Figures 5a and 5b are graphs that explain the conventional distribution in the axial direction and the radial direction of the falling amount of piles on the rotating screen, and Figures 6a and 6b are graphs for explaining the embodiment of Figure 4 corresponding to Figures 5a and 5b.

1, 1' … pile dropping apparatus, 3 … pile, 4 … high-voltage electrode, 5 … work, 6 … surface to be flocked (adhesive layer), B, C … forced air current

Applicant: Toyota Motor Corporation
Agent: Yukiharu TOMITA
[seal: Seal of Patent Attorney Yukiharu TOMITA]

FIGURE 1

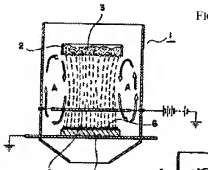


FIGURE 2

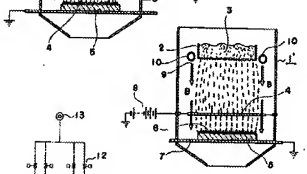
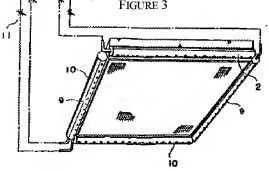


FIGURE 3



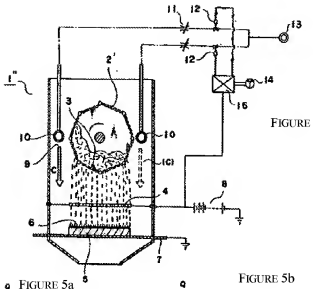


FIGURE 4

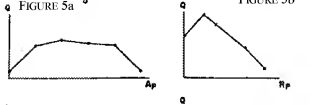


FIGURE 5a

FIGURE 5b

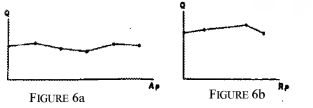


FIGURE 6a

FIGURE 6b